

WWW.SPACE.EDU Space Education over the Internet

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For a decade, the Department of Space Studies has offered the world's first interdisciplinary M.S. degree in space studies. Our approach has been to provide students a broad education encompassing space science, technology, medicine, commerce, law and policy. This has been remarkably successful; more than 220 Space Studies graduates now work throughout the aerospace and remote sensing industry, NASA, the military, and other federal and state agencies. The majority of our students come to North Dakota specifically for the Space Studies degree. However, because of family, job or other obligations some students can not come to North Dakota for two years to take our traditional campus program. We thus invented SPACE.EDU .

SPACE.EDU is a virtual university program that uses appropriate electronic technology to provide content, discussion and advisement to students. The lecture mode of information transmission is provided by videotaping campus classes in a state-of-the-art studio/classroom. For example, during one semester, a course is videotaped while being taught to campus students. At the end of the semester the videotapes are commercially duplicated (super long play so that 35 hours of lectures fit on 6 tapes) and mailed to the SPACE.EDU students. The next semester, the distance students watch 3 hours of videotaped lectures each week, read assigned material in the text, and participate in a weekly one hour discussion session. The discussion session uses Internet Relay Chat (IRC), an Internet standard which permits multiple participants to communicate real-time using a text-based interface. Our chat sessions are limited to 15 to 20 students in order to maximize interaction between students and the instructor. In its first year, SPACE.EDU registered 135 students from 24 states and 5 countries, doubling the number of Space Studies students and doubling the faculty's teaching load.

Our World Wide Web homepage (<http://www.space.edu>) is the virtual campus for SPACE.EDU students. The site attempts to offer all the amenities and services that a student would typically find on campus. Students can register for classes, find out about student loans, check the syllabus and assignments for a class, use the directory to find the email address for other students in their classes, post comments to students and faculty, seek advice from faculty, acquire references from the library, turn in assignments and take online exams.

During the second summer that students are in SPACE.EDU they will visit the University of North Dakota campus for an eight day capstone course. This course includes three components: presentation of student collaborative projects, hands-on use of telescopes, GPS, satellite receiving system and image processing lab, and comprehensive examinations.

A survey of SPACE.EDU students reveal that they are typical non-traditional students. The average age is 38 years, most are married and have space-related jobs. At least three already have PhDs in other fields. All feel that the knowledge learned and the M.S. credential earned will help them progress in their careers. The students appreciate the flexibility designed into SPACE.EDU. They watch tapes and read texts according to their schedules. They choose their discussion session from multiple time slots and can change to another time when necessary. Both students

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and faculty have participated in discussion sessions from hotels or offices while on business travel. Faculty make a strong effort to respond to email questions as soon as they arrive so that even though students may be half way around the world, they still feel they are personally connected to a caring educational program. The worst problems with this delivery method have been associated with the technology. Problems sometimes exist on both ends of the connection. At SPACE.EDU, the server has crashed during an on-line exam, while on the student's end, some people have had persistent connection problems with their Internet Service Providers (ISPs) and out-dated software.

SPACE.EDU is not a static program. As technological capabilities improve, changes will be incorporated into the program. The IRCs are being augmented with audio broadcasts of instructors' comments using RealAudio software. As modems become faster and ISDN and cable modems become more widely available and cheaper, the chat sessions will ultimately incorporate live video and audio. And sometime in the next few years, when the next generation Internet provides high speed connectivity, lectures will be streamed to students on demand.

In January, 1997 SPACE.EDU offered its first course taught by instructors not on the staff of the University of North Dakota. SpSt 590: Tele-Robotics is a one credit short course taught by scientists and engineers at NASA Ames Research Center in California. The entire course will be taught live over the Internet. One of the goals will be to evaluate the effectiveness of different technologies in this setting. CUSeeMe, Real Audio, WebChat, M-Bone, email and web pages will be used for presentation of material and discussion. The highlight of the course will be the opportunity for distance students to operate robots over the Internet. We anticipate offering one such short course each semester, with the first ones coming from various NASA centers and focusing on topics such as Mars exploration, Landsat 7, Mission to Planet Earth, and advanced launch systems.

SPACE.EDU has greatly enlarged Space Studies scale of operations, but it has also strongly affected campus teaching. In preparation for videotaping, most courses have been redesigned to use PowerPoint slides, thus improving visuals for campus students, too. Additionally, since all of the SPACE.EDU students have computers we are developing various computer simulations to enhance understanding of concepts (see Stimulating Sims abstract by Wood, Dilley and Carlson). Both distant and campus students use these simulations. Similarly, we are designing a new image processing course that will be based on interactive experiments in which students actively learn by manipulating image data through their web browsers. Another related project is development of a research quality telescope that will be controlled by students over the Internet. All of these activities improve the learning for both campus and distant students. And it makes teaching more fun for faculty!

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